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# THE BRITISH PHARMACOPŒIA AND ITS CRITICS.

BY PROFESSOR ATTFIELD, F.R.S., ETC.,

*One of the three Editors of the Pharmacopœia.*

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IN the following paragraphs the writer has endeavoured to reply to all the pharmaceutical criticisms on the British Pharmacopœia, 1885, which have up to the present time been published in the journals of pharmacy.

### *The Preface.*

*Proportional Parts.*—Stephenson thinks their introduction needless, Martin regards the insertion as a compromise productive of evil, Umney complains that they do not inform at a glance like those of the Codex, Cracknell approves of the present preliminary partial introduction. The Preface claims no more for this method of setting out quantities of materials in certain cases than that it is an attempt or experiment. According as it commends itself or otherwise to those who use the Pharmacopœia, the plan can in future editions be either developed or abandoned. To inform at a glance the parts must stand alone and have simple relationship like those of the Codex.

*Disintegration of Drugs.*—Official recognition of the use of sieves of particular sizes of mesh is commended by Martin, Botham, Millhouse and Umney, but the three latter would extend the direction to use a given sieve to many additional drugs. The obvious reply is that where such use is not enjoined the judgment of the operator is relied on. If in any of these latter cases the expediency of introducing this plan of ensuring the uniformity of mechanical treatment of a drug should be demonstrated, the method can be extended in due time.

*Substances made at Chemical Works.*—A. E. Robinson would omit the details of the processes for the preparation of chemical substances made only on a very large scale in a few factories. Such a mode of treating the paragraphs in question has been observed as regards newly introduced remedies and some others. Howard would have carried the treatment further. In such matters most of those who use a pharmacopœia are conservative, only a few radical. *Festina lente* has to be one of the mottoes of compilers of a pharmacopœia.

*Tests.*—Burnett and E. Davies would have the *modus operandi* of tests inserted. A pharmacopœia is not and cannot be made an educational handbook. The Editor of the *Pharmaceutical Journal* would, in certain cases, specify the required percentage of active principle of the drugs and leave the mere method of testing to the judgment of the operator, as, for example, in the case of citrate of iron and quinine. Here commensurate skill is assumed, and even the said Editor only says that such competence "should" be possessed by the pharmacist. When all pharmacists are analysts the suggestion may be further considered.

*Nomenclature.*—Martindale objects to the giving of one name to two or more medicinal agents, and wants to know which of the two sennas he is to use, which of the three starches, which of the two alums, which of the innumerable paraffins, which salicylic acid, which carbolic acid, which aloin; and regrets that the Pharmacopœia authorities have not in each of these cases given an asterisk to guide him. But these are not cases in which one name is given to two or more different medicinal agents; the agents as medicines are practically one and the same, and

therefore one name practically suffices. Do pharmacists generally, and dispensers particularly, really need to have their judgment and discretion circumscribed in the manner desired by Martindale, and in so simple a matter as this to have their own footsteps, as well as his, guided by a star?

*Doses.*—Differences of opinion having been expressed on this subject, the writer has been requested to draw attention to the following extract from page xiv. of the prefatory matter of the Pharmacopœia. Respecting doses, "they are not authoritatively enjoined by the Council, and the practitioner must rely on his own judgment and act on his own responsibility in graduating the doses of any therapeutic agents which he may wish to administer to his patients."

### *The Text.*

*Acetum Scillæ.*—Conroy thinks this is too weak in acid for stability, and would add more. Millhouse says it would keep better if of double strength. Abraham, a third pharmacist, does not think it too weak for stability, and that more acid would seriously alter its character. This is one of the numerous cases in which the critics, not yet being agreed, their criticisms neutralize each other and therefore call for no reply from the writer.

*Acidum Arseniosum.* E. Davies thinks, should be called an anhydride, but he does not offer prescribers a Latin equivalent. "Arsenious anhydride" is already given as a synonym, and it is described as an anhydride in the text.

*Acidum Benzoicum.*—A. E. Robinson says a test for cinnamic acid should have been included. Without further physiological research this would seem to be an unnecessary refinement, for Erdmann and Marchand state that each as a medicine is converted into hippuric acid.

*Acidum Carbolicum.*—The official boiling-point is "not higher than 188.3° C." Umney would have it 183° to 184°; E. Davies, 182°; Symes thinks the editors wise in requiring only medicinal, not chemical, purity. Again the critics differ.

*Acidum Hydrobromicum Dilutum.*—Abraham leans to the old weak, highly impure, Fothergill acid. Ward would make it by another process; Burnett by still another. Conroy, Umney, A. E. Robinson and Martindale commend that given in the B.P. The process is by Fletcher, who, doubtless before noticing the presence of his own child, said, as one of the concluding remarks to a letter in the *Pharmaceutical Journal*, "no one thinks of looking for common sense in a Pharmacopœia." This is *more suo*, and perhaps may be excused. Such a "trenchant remark" and such "censure" would probably not have been offered a month later.

*Acidum Lacticum.*—This is officially described as "colourless." Umney says "pale yellowish" would be more accurate. Martindale says it can be had colourless in commerce.

*Acidum Nitro-hydrochloricum Dilutum.*—The process for this is somewhat changed as suggested by the unquestioned researches of Tilden, but Maben thinks the change not worth making.

*Acidum Oleicum.*—Why does Umney charge the Pharmacopœia with defining this as "odourless, tasteless and nearly colourless?" The official characters are "a straw-coloured liquid, nearly odourless and tasteless."

*Acidum Sulphuricum Aromaticum.*—Maben in-



sinnates that the specific gravity was got by calculation. It was got, wrongly or rightly, by experiment. Stephenson sees in the use of tincture of ginger and spirit of cinnamon, in place of the crude drugs, an inconvenient change; while Conroy would use tincture of cinnamon for the sake of its colour and aroma. Maben, on the other hand, says this acid is less troublesome to prepare than the old; Conroy, too, thinks it a decided improvement; Abraham says the taste of new and old are practically identical; while Millhouse regards the new as agreeable, satisfactory and easily made; Martindale wishes it to be converted into ethyl-sulphuric acid.

*Acidum Sulphurosum*.—Umney's strength for a 5 per cent. acid was 1.027; but his colleague Tyrer admits that Giles and Shearer's results were superior to their own. The specific gravity given by Giles and Shearer (1.027) is adopted in the Pharmacopœia.

*Adeps Præparatus*.—While praising the improvement in the process, Abraham and Conroy would strain the melted fat through something finer than flannel, but do not specify the material. Now there is flannel and flannel; and Willmott has demonstrated the damage done to lard when exposed to the oxidising influences at work during slow filtration.

*Æther Aceticus*.—Umney rightly intimates that faults in the old process were pointed out by himself. He might have added that most of the improvements in the present process are those published by Inglis Clark. A. E. Robinson makes the probably useful suggestion that the acetate of sodium should be dried and fused, and that the anhydrous salt should also be employed as the final desiccating agent.

*Alcohol Ethylicum*.—Abraham and E. Davies regret the lowering of official requirements from 99½ to 98 or even 99 per cent. It was the result of experimental investigation as to an "absolute alcohol" that could be obtained with reasonable facility, and yet be sufficiently "absolute" for official purposes.

*Ammonii Bromidum*.—Burnett says this salt is more cheaply made from ferrous bromide and ammonium carbonate. There is no reason why he or any one else should not so make it. The Pharmacopœia simply states that it "may" be formed by neutralizing hydrobromic acid with ammonia. (See the Preface.)

*Amyl Nitris*.—A. E. Robinson would like to have had details for its production and more precise tests. A practical paper, showing how his wishes can be accomplished, would be welcome.

*Antimonium Nigrum Purificatum*.—E. Davies and Conroy criticise the official means of detection and removal of arsenium. Here again research is required, which shall include the determination of the extent to which the article is now liable to contamination by compounds of arsenium.

*Antimonium Tartaratum*.—E. Davies suggests a too impractical and too theoretical Latin name for tartar emetic, namely, *Antimonii et Potassii Oxytartras*.

*Apomorphine Hydrochloras*.—There is some difference of opinion as to the relation of this substance to solvents. In place of the present actual figures relating to solubility, Dott's more general terms "completely soluble in water and in spirit" would, perhaps, have been preferable. Martindale admits he has made a mistake "in another place" in stating the solubility in water as 1 in 7, and says it should be "soluble in 35 parts of water." A great authority on solubilities of alkaloidal substances tells the writer that Martindale is quite wrong in giving

the solubility as 1 in 35, and that he shall take notice of this and other statements at the first opportunity.

*Aqua Aurantii Floris*.—Freshfield Reynolds correctly says the Pharmacopœia does not decide whether the "triple" article or that diluted with two volumes of water should be used. He will find by reference to the 'Proceedings of the British Pharmaceutical Conference of 1878,' that medical practice varies greatly in this matter. The Pharmacopœia has, for the first time, drawn the attention of medical men to this variation, and thus paved the way for an authoritative decision for which at present the data are insufficient.

*Aqua Camphoræ*.—Thompson says that the official process of digesting camphor in water is obsolete, and suggests pouring a solution of camphor in "absolute" alcohol into water. (Is it obsolete?) Proctor says, "the presence of spirit in the waters," including camphor water, "is quite objectionable; I have repeatedly seen waters prepared by the aid of spirit turn sour by keeping." Remington says, "the small percentage of alcohol in the medicated water is converted into acetic acid when long kept, and thus the preparation is soured."

*Arsenii Iodidum*.—A. E. Robinson asks for details of process. The Pharmacopœia offers alternative processes, and could not, therefore, well give details. Pharmacists who, like Mr. Robinson, are chemists, need no details, and pharmacists who are not chemists had better not dabble with details involving danger to life.

*Bismuthi Subnitras*.—Howard points to the chemical formula as possibly indicating the official requirements respecting purity. There are in the Pharmacopœia abundant illustrations of the fact that the chemical formula given under the name of a substance is not intended to indicate the degree of purity of the substance.

*Bismuthum Purificatum*.—A. E. Robinson suggests severer tests for arsenium. Allocation of the line between what have usefully been termed medicinal purity and chemical purity is always difficult. More light is wanted here, which experiments on bismuth containing known proportions of arsenium can usefully supply.

*Caffeina Citras*.—Umney says, "a reference to the researches of German chemists shows that true citrate of caffeine does not exist." Here Umney goes too far. He quotes Biedermann and Lloyd. In a notice of Lloyd's paper in the *Pharm. Journ.* for March, 1881, p. 760, occurs the following sentence:—"Citrate of caffeine is a definite compound." Again, the whole tendency of Biedermann and Schmidt's researches would seem to be (*Pharm. Journ.*, Apr., 1883, p. 880) to show that caffeine does form true compounds with the organic acids. All agree that these compounds are readily dissociated, even by the weak influence of the chemical substances commonly termed solvents. It was only after careful examination of the literature of the subject that the editors of the Pharmacopœia ventured to suggest as a definition of citrate of caffeine, "a weak compound of caffeine and citric acid."

*Calamina Preparata*.—Nuthall, Dawson and Abraham raise old questions respecting the colour, etc., of this substance. They are referred to a literary duel between the late Tilbury Fox and the Editor of the *Pharmaceutical Journal* (ser. 3, vol. v., pp. 381, 419 and 440). More than one of the great



medical corporations has desired the restoration of calamine to the Pharmacopœia. There may be some temporary difficulty in getting an article having the desired characters, but after demand will probably come supply.

*Calc. Sulphurata*.—E. Davies says this article should be named *calci sulphidum*. The latter name is already given in the Pharmacopœia as a synonym. The subject has been discussed over and over again and is scarcely worthy of further consideration. The Pharmacopœia follows the lead of the majority of writers.

*Cutaplasmata*.—Martin says he has never prepared a poultice for anyone outside his own household; append them, he says, to a manual on nursing, they encumber the pages of a book intended as a guide to pharmacists. But to some pharmacists the instructions may not be unwelcome. And he forgets that the book is also intended as a guide to medical men and through them to nurses and others.

*Cera Flava*.—In B.P., 1867, the melting point of wax was "not under 140°," now it "melts at 146° F." Abraham says the old standard was correct for English wax. That may be, but his own four home-prepared samples melted at 142, 144, 144 and 146; while E. Davies says that of fourteen samples free from paraffin only one melted so low as 145, and thinks 150° F should be the standard. Ruedorff gives the melting point as a little above 146° F. Besides, the condition of good average commercial samples is what must officially be considered rather than that of special home gathered specimens.

*Chloroformum*.—This is said to contain 1 per cent. by weight of ethylic alcohol. Dott considers this should be 1 per 1000. That is much too low. The amount depends on the specific gravity of the produced chloroform. One per cent. per volume would perhaps have been nearer the mark. But the specific gravity will be the best guide as to the quantity of alcohol, which should be added until the specific gravity is neither above nor below 1.497.

*Chrysarobinum*.—The writer has already dealt with some criticisms on chrysarobin. (*Pharm Jour.*, [3], xvi., 458). Martindale says this is not "medullary matter," as officially described. It is not medullary tissue, but it being yielded by medullary tissue (not the pith alone), by disorganization or chemico-physiological degradation, it certainly is medullary matter.

Critics have not quite rightly given the history of chrysarobin. They have omitted to say that it was Kemp who first published an analytical account of it. The present writer first showed its chrysophanic character, while Liebermann and Seidler showed that as it comes from the tree it is not mainly chrysophanic acid, as the writer believed, but potential chrysophanic acid, which by absorption of oxygen may become chrysophanic acid. Experiments on the wood of the tree would probably show the true parentage of the substance, resins or otherwise; while therapeutic investigation of it as now used in medicine and of chrysophanic acid should be made with the object of deciding whether the definite body chrysophanic acid is not on the whole the best for therapeutic employment.

*Cinchonæ Rubræ Cortex*.—In view of the proved medicinal value of cinchonidine and the general alkaloidal character of this bark the contention by Umney that of the amount of quinine and cinchonidine that is to be present only a trace may be

quinine cannot well be maintained as a really "serious" state of things. Burnett's complaint that in the assay the shaking with acid is "rather tedious" is only less "serious." Powell rightly thinks that the decoction and infusion should be dispensed "almost clear."

*Collodium Vesicans*.—H. W. Jones's ungenerous suggestion respecting "process and formula given without trial on the part of the compilers," and Conroy's statement that he finds "the quantity of pyroxylin is about three times too much," are confuted by the skill and honest candour of Umney, who says that "a further examination of the official process proved that the pyroxylin of the Pharmacopœia would produce a suitable collodion if the instructions for its preparation were strictly adhered to." Martindale asks why his proportions of pyroxylin to blistering liquid have not been adhered to. Tichborne's researches of 1870 and 1862 have rather been consulted, and his recommendation to use for 1 pint,  $\frac{1}{2}$  ounce, or more, has been followed.

*Creasotum*.—A. E. Robinson thinks that an approximate boiling point should have been mentioned. A reasonable suggestion, but samples vary, and the range of temperature during ebullition is very considerable, and the other characters and tests render this one almost valueless.

*Elaterinum* and *Elaterium* are words dangerously alike, says Conroy. Will he suggest a remedy for any such danger? H. W. Jones regards the test for elaterium as evidence of "too much easy-chair work" on the part of the compilers of the Pharmacopœia. This test is by Flückiger and Hanbury, who by its means obtained 33.6 per cent. of elaterine from one London sample and 27.6 from Malta elaterium. The official limits are "25 per cent. or not less than 20 per cent." Even were Mr. Jones's unkind allegation true, which it is not, surely even experts may stand by or sit easily when Flückiger and Hanbury are operating.

*Emplastrum Belladonnæ*.—Stephenson, Umney, Borland, Maben and Conroy regret that this plaster is no longer green, as when made from an alcoholic extract of the leaves; while Martindale disagrees, and says the old was always dirty and disliked by patients. Redwood says "wait, and your customers will soon become as accustomed to the brown as to the green." Moss considers the new plaster a decided improvement.

*Ergota*.—Millhouse thinks a test should have been inserted, but does not say what test.

*Ergotinum*.—Abraham says the process has "the very serious objection that it places the honest manufacturer at a disadvantage by compelling him to adopt an extravagant process, whereas the object doubtless aimed at will not be attained because the retailer will not make by such a process." The writer does not quite follow the argument. Is not honesty the best policy here?

*Extractum Bellæ Liquidum*.—Conroy says the increase of spirit from 12½ to 18 or 19 per cent. is not enough, he would go to 25. Time will tell.

*Extractum Belladonnæ Alcoholicum*.—Conroy, Hornblower and Perry would chase residual spirit from the marc not by "water" but spirit, and so avoid choking the percolator. Stoddart has taught otherwise respecting such drugs; but the point is evidently worthy of further investigation. Botham says the proportion of spirit ordered does not remove all extractive matter, but admits it may



remove all atropine. He does not offer proof that the matter which he says is lost is of any value.

*Extractum Cascarae Sagradae and Extractum Cascarae Sagradae Liquidum.*—Why exhaust the former with dilute spirit and the latter with water? ask Conroy and Burd, and Martindale echoes the inquiry. The usual precedents have been followed and with care and skill the products are satisfactory, but original investigation is needed here. Experience will guide as to which of the two modes of working is the better.

*Extractum Cinchonae Liquidum.*—The criticisms of pharmacists on this preparation vary as much as the raw material of the article varies. Perhaps the one variation is not altogether unconnected with the other. Millhouse and Cracknell are opposed respecting the miscibility with water of the samples they have prepared. Conroy raises quite a series of objections, while A. E. Robinson says "it leaves little to be desired as representing a thoroughly reliable and stable preparation of cinchona." Umney leaves 40 per cent. of alkaloids in the bark he operates on, Moss and Gravill only 15 per cent. Howard says that "in some cases" half may be left. *Tot capita, tot sensus.*

Referring to the assay of this extract, Maben says of fluid grains "whatever that may mean." Martindale echoes "whatever that may mean." These gentlemen are referred to what is stated in the preface respecting "fluid parts" signifying "the volume of an equal number of parts of water," and to the appendix respecting what is stated of "the grain measure being the volume of a grain of distilled water," and if they cannot draw the not very seriously subtle inference, the next Pharmacopœia will probably render such an effort superfluous. W. N. Allen wanders to the sixth place of decimals to find the fluid grain; but his calculations are founded only on an official approximate statement of the strength of *Liquor Morphinae Hydrochloratis*.

*Extractum Ergotæ Liquidum.*—Ward would not have decreased the proportion of spirit used. Conroy and A. E. Robinson commend the decrease. Umney and Moss would have used still less spirit.

*Extractum Gelsemii Alcoholicum.*—Conroy and Perry say of this what they said of *Extractum Belladonnae Alcoholicum*, which see.

*Extractum Glycyrrhizæ Liquidum.*—Conroy approves of the increase of spirit from one-eighth to one-sixth, but would have added as much as one-fourth, to prevent fermentation in summer. *Tempus omnia revelat.*

*Extractum Jaborandi.*—Perry repeats his criticism. *Vide ante, Extractum Belladonnae Alcoholicum.*

*Extractum Nucis Vomicae.*—Martin says this will vary in moistness, becoming too strong as it dries, and that the only remedy is to dry and powder and standardize the product. Botham repeats. Could not pharmacists adopt another remedy, not altogether unfamiliar to them in dealing with soft extracts, and use—an excipient? Gravill says the addition of milk sugar gives a presentable product. Conroy says—exhaustion good, product superior to old, standardizing satisfactory, test trustworthy.

*Extractum Opii.*—Umney, supported by Moss, says that "opium in powder" as ordered commonly yields much over the 50 per cent. of product directed to be obtained, and makes the useful suggestion that the words "in powder" be omitted—which has been

accepted. The direction that "this extract should yield about 20 per cent. of morphine," which is the important new feature, still, of course, holds good.

*Extractum Pareiræ Liquidum.*—Umney would make this not from the extract as ordered, but direct from the root. But Proctor long ago showed that pareira root varied much in yield of extract, and that therefore the strength of a given bulk of liquid extract prepared direct from a given weight of root would rarely be twice alike. Hence the present process. Conroy approves of the process, stating that in his experience the root may yield about three times as much extract at one time as at another, that is, from 26 down to 9 per cent. Moss, also, disagrees with Umney.

Umney says the present liquid extract is about three times stronger than the old. Not necessarily; the old might have been the same strength and might have been weaker. From Conroy's data 16 fluid ounces of the old might have contained as much as 4 ounces of extract or as little as  $1\frac{1}{2}$ . The present liquid extract will always contain 4 in 16.

*Extractum Rhamni Frangulae.*—Perry repeats his criticism (see *Extractum Belladonnae Alcoholicum*), and Conroy repeats his (see *Extractum Cascarae Sagradae Liquidum*).

*Extractum Sarsæ Liquidum.*—Conroy says of the process it "will probably yield a superior extract to the old form," but Umney, while unable, he states, to guess whether it will be appreciated, because it is unlike anything previously in vogue, yet unhesitatingly says "the process is not a desirable one, and certainly, for the exhaustion of sarsaparilla, most wasteful." Umney, while properly, and more or less modestly, directing attention to his own opinions, and numerous valuable pharmaceutical notes and papers, seems in this case to have overlooked the labours and statements of Proctor, Stephenson, Duhamell, Smith, Husband and Barton.

*Extractum Taraxaci Liquidum.*—Cracknell thinks the process of the American Pharmacopœia superior. Umney approves of the new British extract.

*Ferri et Ammonii Citras, Ferrum Tartaratum.*—The criticisms on these substances have been dealt with by Redwood.

*Ferri et Quininae Citras.*—The valuable criticisms of Fletcher and Umney have resulted in the reduction of the official requirements as regards strength in alkaloid from 16 to 15 per cent.

*Glycerinum Acidi Tannici.*—Millhouse would add a little water to this preparation and to the glycerines of carbolic acid, gallic acid, and alum. Baxter points out that if water were added to the tannic preparation it might be spoilt for throat affections, being then rendered thin enough to run away from the parts. Some of the glycerines are made up with water to avoid inconvenient consistence, and for other special purposes. Otherwise dilution is left to the medical practitioner, who decides not only whether it be needless, useful, or indispensable, but to what extent it should be carried.

*Injectio Morphinae Hypodermicae.*—Botham's criticisms have been met by Farr, who rightly shows that loss of alkaloid in washings and filtrates requires the apparent excess of salt ordered in the formula, and says the same remark applies to the test. Bearing in mind the more correct formula now given for acetate of morphine it will be seen that the strength of the present injection, as shown by Gravill, does not greatly exceed that of the last



Pharmacopœia. Martindale recommends hydrochloric acid in place of the camphor water.

*Lamellæ*.—Millhouse, Burnett, and A. E. Robinson desire details respecting the preparation of the discs of atropine, cocaine, and physostigmine. The Pharmacopœia allows of variation in details so long as strength is maintained. There is no evidence yet forthcoming that rigidity of details is desirable.

*Lini Farina*.—Abraham, and afterwards Umney, object to this name for linseed meal as now described, but they offer no better.

*Linimentum Aconiti*.—Martin is unable to understand the footnote relating to the increased amount of product now got from a given weight of root. It has evidently been understood by other critics, Stephenson going so far as to approve of the alteration to which the sentence alludes.

*Linimentum Belladonnæ* is similarly referred to by Martin and by Stephenson.

Umney would have ordered that 20 ounces of root should yield 40 ounces of liniment, not 30 as now officially ordered. But Umney's own researches show that even when he himself operated "under the most favourable circumstances" the 40 ounces were only "almost as strong" as the 20 ordered in the last Pharmacopœia. This and other results induced the editors to recommend the present proportions of products to raw materials. Any weakening of the liniment was undesirable.

Umney would also make the belladonna liniment from the alcoholic extract and the aconite liniment from the extract "for economy's sake." Waste is wicked, but is risk of alteration in the characters of preparations of drugs worth running when the only advantage is a possible economy—economy in which the patient has no share or interest whatever, and is the last to demand? Who gets the benefit of such economy? Mr. Umney's contention must be more fully supported before the Pharmacopœia can be altered in the direction he desires.

*Liquor Ammonii Acetatis, Liquor Ammonii Acetatis Fortior, Liquor Ammonii Citratis, Liquor Ammonii Citratis Fortior*.—The useful criticisms on these solutions have been dealt with by the writer elsewhere (*Pharm. Journ.*, [3], xvi., 458).

*Liquor Arsenicalis, Liq. Arsenici Hydrochloricus*, and the other poisonous liquors.—No doubt change is troublesome, but the change of strength of these solutions from 4 grains per ounce (1 in about 109) to 1 in about 100 will soon cease to trouble Stephens, Martin, Maben, Conroy, Barnes, Jun., and Millhouse. Umney says "this change to percentage will be found to be advantageous to prescriber and dispenser, enabling them to count and calculate like modern people." Martindale would carry decimal proportions further, even to the tinctures. Very eminent medical authorities have accepted this change.

*Liquor Arsenii et Hydrargyri Iodidi*.—Cracknell notices a slight separation of arsenium from this solution, and says an older mode of mixing is better. Saul remarks that the slight excess of ingredients over Donovan's proportions allows for the separation, and that he had not found any difficulty in making the solution.

*Liquor Atropinæ Sulphatis*. See *Liq. Arsenicalis*.

*Liquor Bismuthi et Ammonii Citratis*.—Saul characterizes this as unstable, requiring 10 per cent. of spirit to preserve it, and thinks its inclusion is foolish considering that the salt itself is official. Umney praises the process and says manufacturers

have used it for years, apparently without any complaint as to its instability. The wisdom of officially including an article so largely in demand should not admit of serious question. Howard regards the process as a great improvement.

*Liquor Calcis Saccharatus*.—Saccharated solution of lime should be termed solution of saccharated lime, says Burnett. One is tempted to reply, "how strange there should such difference be 'twixt tweedledum and tweedledee," but there really would seem to be some chemistry in the criticism.

*Liquor Epispasticus*.—The quantity of cantharides for 1 pint has been reduced from 8 ounces to 5 ounces, but the strength of the product is greatly increased because the material is far more perfectly exhausted. Umney would have still used 8 ounces. Martindale says the strength "appears to have been reduced without sufficient reason." J. Deane's investigations may be quoted as demonstrating that the strength of this solution has been not reduced—Martindale is wrong—but increased, to nearly double—as 13.75 are to 8. The old solution was lamentably weak, but whether its strength should have been increased nearly twofold, as has been done, or nearly threefold as Umney suggests, remains to be proved.

*Liquor Ferri Dialysatus*.—Critics differ as to the usefulness of this addition to the Pharmacopœia.

*Liquor Ferri Perchloridi Fortior*.—Maben prepared a sample and it had, he says, the specific gravity 1.43. Umney says the official specific gravity, 1.42, is correct.

*Liquor Hydrargyri Perchloridi*.—Martindale says this is not a solution of perchloride of mercury but of *sal alembroth*. Would he have the name changed? If so, to what?

*Liquor Morphinæ Acetatis*.—Martin says, "the authorities appear to have overlooked the condensation which takes place in mixing the spirit with the water." This is too bad; the evidence, so far as it goes, being the other way. The authorities in the latter part of the directions say, not add water and add spirit, but, add a *mixture* of water and spirit, because they bore in mind, amongst other reasons, the said condensation. Again, they do not say make the solution 1 in 100, as Martin assumes, but *about* 1 in 100 as he quotes. The penultimate paragraph of Martin's paper betrays not only an uncomplimentary spirit but a foregone conclusion that more than once warps his judgment in the course of his criticisms.

*Liquor Morphinæ Bimeconatis*.—Dott and afterwards Fletcher treat a slight clerical error as a chemical error. If they had looked to the characters of either of the three official morphine salts they would have seen the true nature of the slip. (It was published in the official list of corrections before Dott's not unkind statement appeared and long before Fletcher's most unfair paragraph was penned.) Martindale, in regard to this process and the similar one for the hypodermic injection of morphine, finds it "difficult to conceive why the roundabout process of the Pharmacopœia should have been inserted." The process consists in preparing the morphine and dissolving it in the respective acids. Martindale stated—and demonstrated the statement by experiment at the meeting at which he read his paper—that the far more simple plan was to take the morphine and dissolve it in the respective acids. What does he mean? Where is the difference?



*Liquor Sodii Arseniatis.* See *Liquor Arsenicalis*.

*Liquor Strychnine Hydrochloratis.*—For replies to criticisms on percentage strength, see *Liquor Arsenicalis*, and on condensation in menstruum, see *Liquor Morphine Acetatis*.

*Lithii Citras.*—To 50 parts of carbonate of lithium Umney would put, not 90 of citric acid as ordered, but 94 or 95. His carbonate of lithium is probably above the fair average degree of purity.

*Mistura Gentiane* should have been retained, says Stephenson. *Mistura Gentiane* can very well be spared, says another pharmacist, Martin.

*Oleatum Hydrargyri* and *O. Zinci*, "both being prepared by the most ancient of processes," says A. E. Robinson, while another maker of such substances, Conroy, says "the processes for their preparation work well." One pharmaceutical critic, Pollard, objects to the word *oleatum*; another, Saul, disagrees with Pollard.

*Oleo-resina Cubebe.*—Why the authorities should fix upon this and not include *oleo-resina zingiberis* is more than Martin can tell. The reply is that there was a medical demand for an official process for the former but for no other.

*Oleum Phosphoratum*, says Martindale, is increased in strength from 1 in 160 to 1 in 100. His arithmetic is weak here. The statement should be from 1 in 160 to 1 in 120 or else from 1 in 133 to 1 in 100. He may use either pair of figures he pleases, but not the highest of one of the pairs (the pair relating to volume) and the lowest of the other pair (the pair relating to weight). Then he says that the stated dose—5 to 10 minims—is equal to  $\frac{1}{20}$  to  $\frac{1}{10}$  of a grain of phosphorus. Wrong again, it is equal to  $\frac{1}{24}$  to  $\frac{1}{12}$ . Then of the amounts he wrongly quotes ( $\frac{1}{20}$  to  $\frac{1}{10}$  of a grain) he says he is informed these are poisonous doses. Thoroughgood, in his 'Materia Medica,' published eleven years ago, alluding to a phosphorated oil of exactly the strength of the present official oil—16 grains in 4 ounces—says it "may be given in a dose of 5 to 10 minims mixed in emulsion, or it may be given in a small capsule of gelatine." In Walter G. Smith's 'Commentary on the British Pharmacopœia, 1867,' he states that phosphorized oil is best prescribed in gelatine capsules prepared so as to contain  $\frac{1}{30}$ ,  $\frac{1}{20}$ , or  $\frac{1}{10}$  of a grain in each. The critic's information is not supported by these medical authorities. Besides the Preface expressly states that the doses given in the Pharmacopœia "are not authoritatively enjoined by the Council, and the practitioner must rely on his own judgment and act on his own responsibility in graduating the doses of any therapeutic agents which he may wish to administer to his patients."

*Opium.*—To ensure constancy of composition of opiates, the Pharmacopœia directs that the opium from which they are made be in powder and that the powder contain 10 per cent. of morphine. Conroy, Abraham, Umney, Wink, and Perry proclaim this standard too low, tending to foster the importation of inferior opium and the exclusion of superior opium. But the so-called "superior" opium is only opium rich in alkaloids, and can be used for the preparation of alkaloids. As to the standard, Morison once showed at a pharmaceutical meeting samples of opium varying in percentage of morphine from 3 to 12; equivalent in the dry powder to certainly not more than 4 to 16 per cent.—average 10. Proctor has stated that Turkey opium varies in strength from 4 to 12 per cent. of morphine, say 5 to 15 per cent.

in the dry powder—average 10. Sixteen samples of opium "ordinary commercial samples such as are commonly met with in the English market" were shown at a pharmaceutical exhibition at Nottingham in 1866 and their yield of morphine and moisture were stated. The average yield of morphine by the dried and powdered opium was  $9\frac{2}{3}$  per cent.—say average 10.

Wink supported his endorsement of Umney's criticism by exhibiting at the recent pharmaceutical meeting three samples of opium, 100 grains of each yielding respectively  $11\frac{1}{2}$ , 7, and  $5\frac{1}{2}$  grains of morphine; the 300 grains therefore yielding 24 grains of morphine, or on the average 100 grains yielding 8. But the 100 grains would equal about 80 grains of dry powdered opium, which would contain the 8 grains of morphine. If 80 contained 8, 100 would contain 10. Therefore if Wink will only dry, powder, and mix his opium—his own selection of samples in support of his and Umney's contention respecting the seriously low official standard—he will get exactly the article the Pharmacopœia prescribes. Let us go back to the old state of things, says Wink, and let the purchaser be the judge. Neither his arguments nor his exhibits support his proposition; on the contrary they support the ruling of the Pharmacopœia.

Umney says the wholesale druggists are all asking what they are to do with their opium? Answer: Assay, select, dry, powder and mix.

What was Umney's answer? "I need hardly say that, notwithstanding my loyalty to the Pharmacopœia, I advised that, at any rate for the present, it would be best to leave matters as they were, for nothing would make me believe that either medical men or pharmacists would endorse the dilution of powdered opium rich in alkaloid with opium marc or some such harmless diluent as sugar of milk." His loyalty is, apparently, in no real danger. What medical men and retail pharmacists will not endorse is a return to the use of opium varying in percentage of morphine from 3 parts in 100 to 12 parts in 100, that is varying 400 per cent; and will not even return to the use of opium containing 8 parts in 100 to 12 parts in 100, that is varying 50 per cent. Surely it is not necessary for science to say to commerce *tempori parendum*!

*Opium Test.*—Abraham thinks the process tedious. Evidently he can himself shorten it. A. E. Robinson says it is reliable, works well, and gives excellent results. Perry approves of the method.

*Paraffinum Durum.*—Conroy and Umney would shorten the range of the melting point— $110^{\circ}$  to  $145^{\circ}$  F. It at least gives them the opportunity of using the variety of hard paraffin they prefer.

*Paraffinum Molle.*—Umney would exclude the soft paraffin of lower melting point. Martindale would not. Moss distinctly approves of the inclusion of the soft variety.

*Pepsin* A. E. Robinson regards as crude, and prepared by a crude process, but suggests no better.

*Physostigmia*, Burnett says, is far better known under the name *eserine*. In the Codex the latter is used, but in the German Pharmacopœia and the Pharmacopœia of the United States *physostigmine* is the name employed. Its source is a *Physostigma*. *Eserine* is given as a synonym.

*Pilula Conii Composita.*—Scholey says the treacle is not required. This needs confirmation. Besides only "a sufficiency" is ordered



*Pilula Phosphori*.—Martindale devotes five words to this, namely, "it has had my condemnation." Poor pill. One is irresistibly reminded of four lines descriptive of the results of another celebrated condemnation, familiar enough to readers of the 'Ingoldsby Legends.'

*Pilula Rhei Composita*.—Martindale says one-eighth of the quantity of excipient ordered is all that is needed! The writer has before him a specimen of the pill just made by his pharmaceutical colleague, and containing not "about" the full proportion of treacle, as directed in the formula, but the whole of the treacle. Its condition is perfect. This criticism demands further attention.

*Potassii Acetas* is difficult to get "neutral" A. E. Robinson rightly says, but it can be done.

*Pulvis Tragacanthæ Compositus*.—Scholey would omit the starch as being useless, and because it makes the preparation look unsightly. This criticism needs confirmation. The presence of starch seems to have satisfied prescribers and dispensers for the past hundred and fifty years.

*Salicinum* is said by Dott to be soluble not "in about 28 parts of . . . spirit at common temperatures," but in 50. The published solubility is 1 in about 28, but Dott is so trustworthy an authority, that his figures will displace those hitherto obtaining in pharmaceutical literature when he gives pharmacy the benefit of his experiments on the subject.

*Soda Tartarata*.—E. Davies would term this *Sodii et Potassii Tartras*. The London Pharmacopœia termed it *Sodæ potassio-tartras*; those of Edinburgh and Dublin, *Potassæ et sodæ tartras*; the British Pharmacopœia, 1864, *Sodæ et potassæ tartras*. The British Pharmacopœia, 1867, probably to avoid a conflict of claims, went back to the present form of the old name, *soda tartarata*, soda which has been tartar-ated.

*Spiritus Ætheris Nitrosi*.—The specific gravity is given as 0.840 to 0.845. Umney says he obtained a sample of specific gravity 0.841 when he worked with the official small quantities, but on the large scale his mean was 0.846, and thinks 0.845 near enough for all practical purposes. Where is the force of this criticism? Unless the retailer who makes with the official small quantities is to be shut out, Umney's own figures almost exactly support the range of specific gravity given in the Pharmacopœia.

*Spiritus Ammonie Aromaticus*.—Conroy gives the specific gravity as 0.900; Kitchin, 0.894; Abraham, 0.900; Umney, 0.893. Thresh, who supplied this highly approved official process, explains that by a clerical error he gave the specific gravity 0.886 instead of 0.896. By the bye, the criticisms well illustrate the difficulty of arriving at the exact specific gravities of such fluids, and should teach us all to be lenient and charitable in discussing such matters.

*Succi*.—The juices of belladonna, hemlock, henbane, broom and dandelion group themselves in one class as medicinal juices, hence are placed next to each other in the Pharmacopœia under the common name *succus*. The two fruit juices, *limonis succus* and *mori succus* are placed under the lead of their respective fruit-names, a simple and intelligible principle which Fletcher has failed to perceive.

*Suppositoria Belladonnæ* should have been included, says Perry.

*Syrupi*.—Stephenson thinks the syrups should be

farther removed from saturation, and Maben and Millhouse repeat the criticism. On what published data is this sweeping opinion founded? Cracknell remarks that the syrups are not too thick, and warns against weaker syrups liable to ferment and burst their brittle bonds.

*Syrupus Aurantii Floris*. See *Aqua Aurant. Flor.*

*Syrupus Ferri Iodidi*.—Umney devotes two paragraphs to pharmaceutical denunciations of a syrup of specific gravity 1.400, and to praises of a syrup of specific gravity 1.385. Well, the official figures are not 1.400, and they are 1.385. He would have this official product weigh 2 lbs. 11½ ozs., and not 2 lbs. 11 ozs. There is nothing in the official directions to prevent him doing as he desires. He thinks the boiling of the aqueous solution of the iodide of iron with a little of the syrup useless and unnecessary. Would he mind trying this little modification in the method. It has been successfully practised for some years by a wholesale druggist who probably manufactures the syrup as largely as anyone in the trade. It is founded on the researches of Jeannel and of Hammer (*Pharm. Journ.*, [2], x., 430, [3], vi., 907, and [3], xiii., 1078). Wells seems also to have worked in this direction (*Pharm. Journ.*, [3], xiv., 82).

*Syrupus Ferri Phosphatis*.—Why, asks A. E. Robinson, has not H. W. Jones's process (metallic iron and phosphoric acid) been incorporated? Because there is no published evidence that it has been sufficiently tried in practice to warrant its displacing the present official process.

*Syrupus Zingiberis*.—Scholey draws attention to the fact that the quantities of materials produce only 19 fl. ozs. 6 fl. drachms. It is odd that, so far as the writer is aware, no pharmacist has noticed this short pint during the past eighteen years.

*Tabellæ Nitroglycerini*.—Burnett looks upon the absence of details here as encouraging secret processes of preparation. Martindale says it is a pity more definite instructions were not given respecting the preparation of nitroglycerine tablets. No one is better qualified than Martindale to supply the omission. But considering the dangerous character of nitroglycerine and the legal aspect of this matter it is a question whether in this one case the manufacture of it and its compounds by the minimum number of persons does not offer the least of possible evils.

*Tincturæ*.—Martin's uncomplimentary condemnation of the general process should either not have been written or have been supported by reference to published papers. Nevertheless, there is, of course, room for many experimental pharmaceutical researches on the tinctures and the best mode of preparing each of them or groups of them. If different pharmacists would publish results of their practical experience with the respective tinctures, pharmacy would be much benefited both immediately and through future pharmacopœias.

*Tinctura Chloroformi et Morphine*.—Stephenson says this resembles chlorodyne very well, but he would increase the proportion of morphine and oil of peppermint. Umney would exclude "such nostrums." Moss agrees with Stephenson and disagrees with Umney. The preparation probably admits of improvement. It will doubtless gradually take a place in medicine like many predecessors now only known by orthodox names.

*Tinctura Cinchonæ*.—Umney says the exhaustion of the bark by the proof spirit is still incomplete by



25 per cent. in the case he cites. Is that so in all cases? And if so what improvement can be effected? This would seem to be one of the many tinctures that would repay experimental investigation.

*Tinctura Gelsemii*.—Conroy says rectified spirit is better than the strength now official (proof). The remarks just made apply here also.

*Tinctura Iodi*.—Stephenson and Bland ask if the present formula is intentional. Yes. Practical pharmacists, Martindale and Symes, recommended that the proportion of iodide of potassium should be increased, and this has been done.

*Tinctura Quinine*.—Ward and Botham think this may be made more easily than the directions indicate. The full directions are sometimes desirable.

*Tinctura Quinine Ammoniata*.—Phillips says even the "little heat" to aid solution is not necessary. Employment of "a little heat" is advantageous.

*Unguentum Zinci Oleati*.—Perry says this is too hard, but does not say what was the melting point of the soft paraffin he employed.

*Vinum Ipecacuanhæ*.—Stephenson does not like the look of the process. Maben thinks that not one tenth of the pharmacists who prepared the old will take the trouble required for the new. Conroy thinks the process clumsy, long and tedious. A. E. Robinson says it is obviously impracticable on the large scale. But Umney characterizes it as a working formula. Saul found no great difficulty with it. J. and H. Matthews find it satisfactory. To criticisms so divergent reply is superfluous. It is a practical process by a practical pharmacist, and worth any little trouble and judgment necessary to its successful employment.

*Vinum Quinine*.—Martindale would have had hydrochlorate of quinine used instead of sulphate, as in the case of *tinctura quinine*. There did not seem to be such necessity for the change.

*Zinci Sulphocarbolas*.—E. Davies and A. E. Robinson would prepare this by a different method. The Pharmacopœia authorizes them to vary processes or use others altogether. So with *Zinci Valerianas*.

#### *The Appendix.*

*Acetate of Sodium*.—Umney inquires after this salt. It was formerly used chiefly in official preparations, hence was in the text. It is now chiefly used in testing, hence it is in the appendix. But the statement is there added that it is "also employed in the preparation of acetic ether."

*Weights and Measures*.—Respecting "fluid grains" see *Extractum Cinchonæ Liquidum*.

*Gallons and Litres*.—Abraham says that the Pharmacopœia contradicts itself upon the same leaf in the matter of metric equivalents of imperial weights and fluid measures, that the error runs through the whole series of equivalents of measures of capacity, and points out that he has taken the trouble previously to call attention to the matter and to give a table of correct figures. If he will go still deeper into the subject and take into account the conditions of temperature under which the respective units of the imperial and metric systems are defined he will see that the official figures are all right and his own all wrong. Nevertheless, pharmacists should thank him for having saved them the trouble of resolving what unquestionably has the appearance of inconsistency.

#### *Conclusion.*

And now the writer asks the critics of the British Pharmacopœia, 1835, to give careful and candid consideration to the foregoing replies to their unfavourable criticisms. To their favourable criticisms and on the satisfaction with which Stephenson, E. Davies, Howard, Abraham, Umney, Moss, Martindale and others regard the Pharmacopœia as a whole, it is unnecessary for the writer to offer any comment. Nor can he further notice criticisms on the list of "additions and omissions" *quæ* additions and omissions, or criticisms on the latinity or posology or the very few on the botany of the Pharmacopœia. But he must, without going into pharmaceutical politics, criticise the view which so many of the critics take respecting the share of pharmacists in the construction of the Pharmacopœia. Throughout the criticisms of the Pharmacopœia as a whole one cannot but see that the great majority of critics confuse two distinct and different things, namely, the question of the part that pharmacists take in the construction of the Pharmacopœia, and the question of their position in relation to the part they take in the construction of the Pharmacopœia. The writer, bearing in mind his editorial position in relation to the members of the Medical Council, who by law must produce the Pharmacopœia, on the one hand and his professorial position in relation to the members of the Pharmaceutical Society, who with all other pharmacists must obey the behests of the Pharmacopœia on the other hand, cannot say one word in reference to the second or political relationship of the pharmacist to the Pharmacopœia. But with regard to the former, that is, the pharmaceutical relationship of the pharmacist to the Pharmacopœia, he points to the pages of the Pharmacopœia in confirmation of the statement he now makes, namely, that for the past eighteen years, in fact ever since pharmaceutical editors have had anything to do with the volume, every pharmaceutical discovery made by pharmacists, every improvement of processes or tests, every comment, in short, every contribution to the construction of the Pharmacopœia which has been deemed by their authors worthy of publication has been fully considered by the authorities responsible for the production of the book, and that whenever the contribution has been considered worthy of incorporation—as it has in most cases—it has been incorporated. The consequence is that so far as the pharmacy of the Pharmacopœia is concerned the work is largely, as I have elsewhere said, the pharmacists' own Pharmacopœia. The Pharmacopœia already is largely constructed by themselves; it is they who have supplied the chief pharmaceutical materials of the edifice, their own pharmaceutical experts being employed to put those and the other materials together. One would have thought that pharmacists would have been the first to perceive this fact, and, indeed, to have urged it in support of their claims to that position in relation to pharmacopœid construction which they desire to occupy. But to assert, as the critics so often do, that the practical pharmaceutical element is wanting within the Pharmacopœia, and that therefore they ought to share in its construction is to assert what is first of all contrary to fact, while secondly, the counter-assertion and the statement that pharmacists already largely help to make the book, would better support their cherished policy.